APPENDIX Q1: BIOLOGICAL ASSESSMENT

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Acronyms and Abbreviations

APD	Application for Permit to Drill
APHIS	Animal & Plant Health Inspection Service
APLIC	Avian Power Line Interaction Committee
ARI	Aquatic Resources Inventory
BA	Biological Assessment
BBL	Barrel(s)
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
CBM	Coalbed methane
CD-C	Continental Divide Creston Natural Gas Project
CDOW	Colorado Department of Wildlife
CDWII	Continental Divide Wamsutter II
CIAA	Cumulative Impact Analysis Area
COA	Conditions of Approval
CWA	Clean Water Act
DEIS	Draft Environmental Impact Study
DFC	Desired Future Condition
dBA	Decibels
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy Management Act
FWS	United States Fish and Wildlife Service
GYA	Greater Yellowstone Area
IM	Instruction Memorandum
MLA	Mineral Leasing Act
NEPA	National Environmental Policy Act
NSO	No Surface Occupancy
OHV	Off Highway Vehicle
RFO	Rawlins Field Office
RIP	Recovery & Implementation Program
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
T&E	Threatened or Endangered
USACE	U.S. Army Corps of Engineers
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
WDEQ	Wyoming Department of Environmental Quality
WDEQ-WQD	Wyoming Department of Environmental Quality Water Quality Division
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission
WSGS	Wyoming State Geological Survey
WYNDD	Wyoming Natural Diversity Database

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1. Introduction

This biological assessment discusses the potential effects of the proposed Continental Divide–Creston (CD–C) Natural Gas Development Project on Threatened, Endangered, and Proposed species pursuant to the Endangered Species Act (ESA) of 1973. The assessment also presents recommendations to insure that the development and operation of the proposed project will not jeopardize the continued existence of those species or result in the destruction or adverse modification of their Critical Habitats. We refer the Fish and Wildlife Service (FWS) to the draft CD–C Environmental Impact Statement (EIS) for a greater level of data specific to this project and to the biological assessments and biological opinions prepared for previously permitted projects in the general area (see below).

The information compiled in this biological assessment was gathered from the published literature, agency files and databases, personal communication and meetings with applicable wildlife agency personnel, both State and Federal, and from field surveys conducted specifically for this project.

The Fish and Wildlife Service (USFWS 2013a) provided the list in **Table 1-1** of Endangered, Threatened, Proposed, and Candidate species and their designated Critical Habitats that may occur in Carbon and Sweetwater Counties, including the Continental Divide–Creston project area. Table 1-1 provides an overview of the species listed under the ESA, their habitats, and the potential or likelihood of these species being found in the CD–C project area. If the species or their habitats are known to occur in the area, the Table also provides a determination of the potential of the project to affect the species.

In April 2013, the USFWS (2013c) issued a statewide "block clear" letter to the Wyoming Game and Fish Department (WGFD) in response to their request to "block clear the remaining white-tailed prairie dog range," stating, "Service staff had reviewed the Block Clearance Document and find that the conclusions presented are sound and that your request for statewide block clearance is both warranted and timely." The USFWS (2013c) provided, "The change will be accomplished by expanding the block clearance area currently in place for black-tailed prairie dog range in eastern Wyoming and in portions of the white-tailed prairie dog range to include the entire state of Wyoming." BLM's review of the FWS statement on the species concludes, "This clearance indicates that no presence of black-footed ferrets is expected outside the reintroduction population areas of the state." (BLM 2013b)

Previous Section 7 Consultations

The BLM and FWS have previously entered into Section 7 consultation, both formally and informally, regarding the potential impacts of oil and natural gas exploration and development projects in the Continental Divide–Creston project area. These consultations included the Creston/Blue Gap Natural Gas Project in 1994, the Continental Divide/Wamsutter II Natural Gas Project in 2000, the Desolation Flats Natural Gas Field Development Project in 2002, and the Rawlins Resource Management Plan in 2008. Other consultations in the general area included the Atlantic Rim Natural Gas Project in 2007 and the Chokecherry–Sierra Madre Wind Energy Project in 2012. These documents were reviewed relative to previous determinations of effect made by the two agencies and mitigations or conservation measures deemed necessary to preclude take of a listed or Candidate species and/or its habitat. The BLM and FWS formally consulted on the Rawlins Resource Management Plan (2006-2007) and the biological opinion was issued on January 16, 2007 (USFWS 2007). The BLM Wyoming State Office has also issued several programmatic biological assessments for specific species, including the gray wolf, bald eagle, grizzly bear, Wyoming toad, black-footed ferret, Canada lynx, Ute ladies'-tresses and the Colorado butterfly plant. In the last few years, Environmental Assessments (EA) have been prepared for two oil and gas development projects within and adjacent to the CD-C project area, the Luman Rim project in 2010, and the Table Rock project in 2012. No BA was prepared for either project.

Table 1-1. Endangered, Threatened, Proposed, and Candidate species and their designated Critical Habitats that may occur in Carbon and Sweetwater Counties

Species / Critical Habitat	Scientific Name	Status[1]	Habitat	Occurrence Potential, CD-C Project Area[2]	Effects Determination Summary
Mammals					
Black-footed Ferret	*Mustela nigripes*	Endangered	Prairie dog towns	No	No effect
Black-footed Ferret, Shirley Basin - Experimental/ Non-essential	*Mustela nigripes*	Experimental/ Non-essential	Prairie dog towns, Shirley Basin	No	No effect
Canada Lynx	*Lynx canadensis*	Threatened	Montane forests	VU (possible transportation corridor)	May affect, not likely to adversely affect
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	Threatened	Lush vegetation along watercourses or herbaceous understories in wooded areas near water in SE Wyoming.	No	No effect
Birds					
Greater Sage-Grouse	*Centrocercus urophasianus*	Candidate	Sagebrush communities	P	No effect
Yellow-billed Cuckoo (Western)	*Coccyzus americanus*	Proposed	Riparian areas west of Continental Divide	No	No effect
Amphibians					
Wyoming Toad	*Bufo baxteri*	Endangered	Floodplains, ponds, and seepage lakes occurring between 7,000 and 7,500 ft elev. in the Laramie Basin	No	No effect
Colorado River Fish[3]					
• Bonytail	*Gila elegans*	Endangered	Riverine habitat downstream of Wyoming in the Yampa, Green, and Colorado River systems	PAD	May affect, likely to adversely affect
• Colorado Pikeminnow	*Ptychocheilus lucius*	Endangered			
• Humpback Chub	*Gila cypha*	Endangered			
• Razorback Sucker	*Xyrauchen texanus*	Endangered			

Species / Critical Habitat	Scientific Name	Status[1]	Habitat	Occurrence Potential, CD-C Project Area[2]	Effects Determination Summary
• Critical Habitat	Designated for Colorado River Fish in riverine habitat downstream of Wyoming in the Yampa, Green, and Colorado River systems (see 50 CFR 17.95(e))			PAD	May contribute to the destruction or modification of designated critical habitat
Plants					
Blowout penstemon	*Penstemon haydenii*	Endangered	Sand dunes or blowouts	No	No effect
Colorado butterfly plant	*Gaura neomexicana coloradensis*	Threatened	Moist soils in wet meadows of flood plain areas in SE Wyoming	No	No effect
• Critical Habitat	Approximately 3,538 acres along approximately 51 stream miles in Platte and Laramie counties in southeast Wyoming (FR, Vol 70, No.7, Jan. 11, 2005).			No	No effect
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened	Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation	U	May affect, not likely to adversely affect
Platte River Species					
• Least Tern (interior population)	*Sternula antillarum*	Endangered	Riverine habitat downstream of Wyoming in the Platte River system	No	Not found in or downstream of Continental Divide-Creston project area.
• Piping Plover	*Charadrius melodus*	Threatened			
• Whooping Crane	*Grus americana*	Endangered			
• Pallid Sturgeon	*Scaphirhynchus albus*	Endangered			
• Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened			
• Platte River Species Critical Habitat	Designated for whooping crane in Nebraska in riverine habitat of the Platte River system (see 50 CFR 17.95[b])				

[1] *Candidate species are those for which the USFWS has sufficient information to propose for listing as Threatened or Endangered under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing actions. Proposed species are those Candidate species that were found to warrant listing as either Threatened or Endangered and are currently undergoing a 12-month status review. Conservation measures for Candidate and Proposed species are voluntary but recommended because, by definition, the species may warrant future protection under the ESA if adequate conservation measures are not in place.*

[2] *Occurrence potential includes: present (P); potentially present (pp); unlikely (U); very unlikely (VU); and potentially affected downstream (PAD).*

[3] *Present in the Colorado River system downstream of the project area.*

2. Project Description

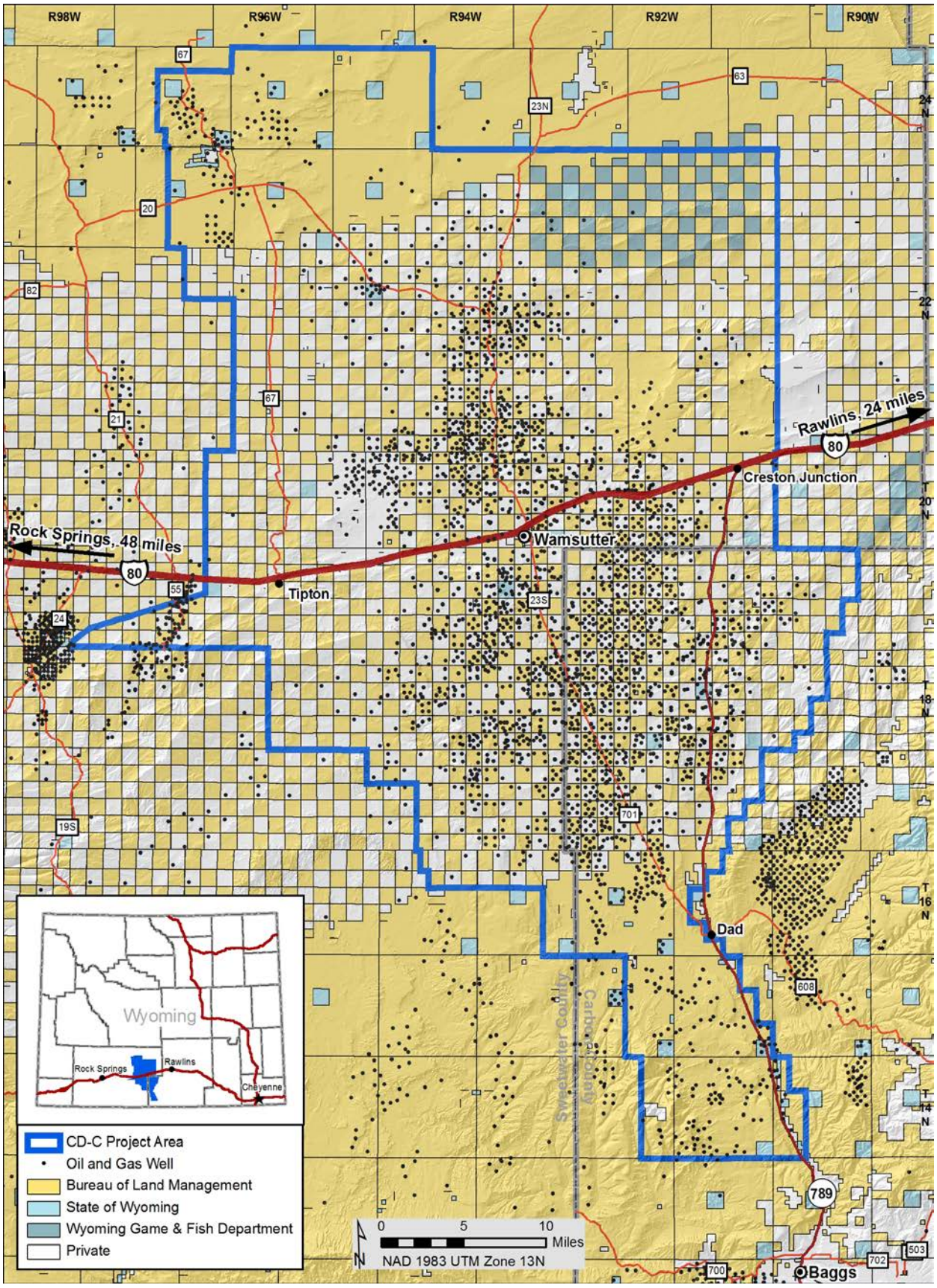
The CD–C Operators propose drilling up to 8,950 natural gas wells in a project area of approximately 1.1 million acres (1,672 square miles) located in Townships 14 through 24 North, Ranges 91 through 98 West, Sixth Principal Meridian, Carbon and Sweetwater counties (**Map 2-1**). The eastern boundary of the Continental Divide–Creston (CD-C) project area is about 25 miles west of the city of Rawlins; the western boundary is roughly 50 miles east of the city of Rock Springs. Interstate 80 (I-80) generally bisects the project area. The checkerboard pattern of land ownership in the central portion of the project area is a result of early land grants from the federal government to the Union Pacific Railroad Company. The BLM, the State of Wyoming, and private owners issued the oil and gas leases covering these lands. The Rawlins Field Office (RFO) manages BLM surface lands and the federal mineral estate in the project area. The BLM manages approximately 626,932 surface acres (58.6 percent), the State of Wyoming owns approximately 48,684 acres (4.5 percent), and private landowners own approximately 394,470 acres (36.9 percent), as shown in **Map 2-1**. The map also shows all natural gas development to date within and adjacent to the project area.

The CD-C project is an infill project in a region that has seen extensive natural gas exploration and development. More than 4,700 wells have already been drilled in the project area. The Continental Divide, Wamsutter, Creston/Blue Gap and Continental Divide/Wamsutter II projects are only a few of the oil and gas projects previously evaluated in the greater Continental Divide-Creston project area. Other projects that lie adjacent to or overlap the CD-C project area include Atlantic Rim to the east, Desolation Flats to the southwest, Table Rock at the center west, and Luman Rim at the northwest corner. Table Rock and Luman Rim are two relatively small projects approved by the Rock Springs Field Office in the last few years. The scale of some of these predecessor and neighboring projects is summarized in **Table 2-1**.

Table 2-1. Oil and gas development in and near the CD-C project area

Project	Date Approved	Drilling to be Complete	Project Acres	Project Wells
Creston/Blue Gap	1994	2014	207,746	275
Continental Divide/Wamsutter II	2000	2015	1,061,200	3,000
Atlantic Rim	2006	2026	270,080	2,000
Desolation Flats	2004	2018	233,542	385
Luman Rim	2010	2015-20	21,471	58
Table Rock	2012	2012-26	13,633	88

The CD-C Draft EIS (DEIS) provides a detailed description and analysis of the Proposed Action and five alternatives: Alternative A: 100-Percent Vertical Drilling; Alternative B: Enhanced Resource Protection; Alternative C: Surface Disturbance Cap—High and Low Density Development Areas; Alternative D: Directional Drilling; and Alternative E: No Action. In the Final EIS, Alternative A was dropped from consideration but the Proposed Action, Alternative B, Alternative C, Alternative D, and Alternative E were carried forward. A new alternative, the Agency Preferred Alternative was added to the Final EIS as Alternative F.



Map 2-1. Continental Divide–Creston project boundary and existing oil and gas development

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

The Agency Preferred Alternative (Alternative F) limits development to no more than eight well pads per section to minimize surface disturbance and reduce impacts to the area's resources, including federally listed and proposed species. The alternative emphasizes transportation planning, development pre-planning, and a fugitive dust control plan. To address salt and sediment impacts to sensitive fish species and general water quality, well pads, access roads, pipelines, and ancillary facilities located within ½ mile of Muddy Creek, Red Wash, and Bitter Creek and within ¼ mile of playas in the Chain Lakes Wildlife Habitat Management Area would be subject to controlled surface use stipulations. The stipulations include monitoring and maintenance of Best Management Practices (BMPs), identification of well locations in these areas as High Inspection Priority areas, boring of all pipeline crossings of perennial drainages and riparian areas, soil stabilization of all disturbances within 30 days of well completions, and closed or semi-closed loop drilling. In addition, a monitoring plan for Muddy Creek has been developed and will be implemented by the BLM. A Wildlife Inventory, Monitoring and Protection Plan is intended to avoid or minimize project impacts to wildlife by monitoring population trends as the field develops, annually reviewing project activities and identified impacts, applying appropriate mitigation, and modifying future development through an adaptive management process. Finally, a CD-C discussion group would be formed that would respond to evolving energy issues. The Agency Preferred Alternative is evaluated in this Biological Assessment.

2.1 Description of the Proposed Project

The CD-C Operators propose drilling up to 8,950 infill natural gas wells, in addition to the more than 4,700 wells already drilled in the project area (**Map 2-1**). Although operations are subject to change as conditions warrant, the Operators' long-term plan of development is to drill at the average rate of approximately 600 wells per year until the resource is fully developed.

The precise locations of these additional wells have not been identified at this time. The Operators anticipate drilling at well densities of up to one down-hole well bore per 40 acres. Based on existing reservoir and well performance information, most gas wells will be completed in the Almond Formation (Mesa Verde Group), although secondary reserves may be encountered in other formations (e.g. Lewis, etc.). The average life of a well is expected to be 30 to 40 years. Combining average well life with a 15-year field development period produces a potential project life of 45 to 55 years. Factors outside of the Operators' control, including geologic characteristics, reservoir quality, engineering technology, and economic conditions could affect the Operators' ability to adequately drain the reservoir and could result in fewer than 8,950 wells being drilled.

Wells may be drilled conventionally (vertically) or directionally from single or multiple well pads. The proposed project also includes construction and operation of ancillary facilities such as: roads; gas, water, and condensate-gathering pipelines; overhead and buried power lines; and separation, dehydration, metering, and fluid-storage facilities.

Table 2-2 shows the estimated surface disturbance for the Agency Preferred Alternative. The alternative is expected to reduce overall surface disturbance by about 7 percent. Initial disturbance is that which will occur during well site, access road and infrastructure construction. It is followed by interim reclamation, as in the case of well pads, and/or final reclamation, as in the case of pipelines; long-term disturbance is that disturbance which will remain over the life of the project, such as access roads, producing well sites, or compressor stations.

Table 2-2. CD-C project area disturbance, Agency Preferred Alternative

Category	Well Pads (incl. roads)	Related O&G Facilities	Total Disturbed Area
		Acres	
Initial	38,497	5,311	43,808
Long-term	16,765	863	17,628

2.1.1 Road Construction Activities

As this project would largely be an infill development in existing natural gas fields, new road construction would not be extensive. The primary access to the project area is I-80. Existing arterial roads, including Wyoming State Highway (WY) 789 and several Sweetwater and Carbon county roads, provide access within the project area. New road construction would primarily be short sections of road from the existing road network to new well sites and support facilities. Some existing access roads may need to be improved to accommodate increased traffic. Specific locations for access roads are not known at this time but will be included in permit applications and will be evaluated by the BLM during onsite inspections.

2.1.2 Well Construction, Drilling, and Completion Activities

The project would include up to 8,950 well bores from both single-well pads and well pads with multiple directional well bores. Construction of a typical conventional single-well pad would require approximately 6.3 acres, which includes 0.9 acres for an access road. A typical multiple-well pad would disturb approximately 2.45 acres per well bore, which includes 0.45 acre for an access road. Operators will determine the locations of new wells according to the subsurface reservoir, the topography of the area, and Wyoming Oil and Gas Conservation Commission (WOGCC) spacing rules. Dimensions of drill pads will depend on topography and specific well needs.

Well-drilling and completion activities will be in compliance with Federal Onshore Oil and Gas Order No. 2. These guidelines specify the following:

> *...proposed casing and cementing programs shall be conducted as approved to protect or isolate all usable water zones, potentially productive zones, lost-circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use.*

The Operators anticipate that the drilling-rig count within the project area would be up to 25 rigs at any particular time in order to achieve development objectives. Wells would be drilled utilizing conventional, mechanically powered mobile drilling rigs. Drilling each gas well would take from 7 to 10 days, with additional time likely for directional wells and wells deeper than 10,000 feet. Completion and testing operations typically require approximately 10 to 20 (up to 30) days to perform. The Operators propose to drill year-round subject to environmental considerations.

Approximately 24,000 to 42,000 barrels (bbls) of water are needed to perform drilling and completion operations for each well. Fresh water would be used for drilling the first 5,000–7,000 feet of each well, and water-based muds would be used for the remainder of the drilling operation. Water would come from existing and new water-supply wells within the project area, as well as from produced-water sources. The use of produced water to the greatest extent possible would conserve fresh-water aquifers. Estimated annual freshwater use within the CD-C project area would range from 1,856 to 3,248 ac-ft /yr and would average 2,552 ac-ft /yr. All freshwater would be withdrawn from groundwater sources; no freshwater would be withdrawn from surface waters. (The depletion calculation related to annual water use for the CD-C project is included in **Section 5.2**, **Colorado River Species**, page 21.)

2.1.3 Production Facilities

Production facilities on the well pad would typically include wellhead valves and piping; separation, dehydration, and metering equipment; oil and water production tanks; a methanol storage tank and pump; and telemetry equipment. Production equipment would be fueled by natural gas or electricity. Telemetry equipment is currently used or planned for use by most Operators to improve well evaluation and operational efficiency, and to minimize well visits. Production pits would not be used. Well-site compression could be utilized on an as-needed basis. Buried natural gas gathering lines would be installed to transport produced gas from new wells to the existing gas-gathering pipeline system.

The project may also include the development of an overhead electrical system to provide commercial power to portions of the field, as well as lower-voltage, buried power utilities to individual well pads. The overhead system is estimated to include approximately 36 miles of line.

2.1.4 Pipeline Facilities

The Operators would use existing natural gas transmission lines that serve the project area. Operators are not responsible for the construction or operation of gas transmission lines and new transmission lines are not included as a component of the CD-C project.

Gathering lines would be installed below the surface to transport the produced gas from the new wells to the gas gathering pipeline system. The gas production lines would be located adjacent and parallel to well access roads where possible to minimize surface disturbance. New pipelines would cross federal, state, and private surfaces in a route developed to minimize both resource conflicts and development costs.

Pipeline construction consists of trenching, pipe stringing, bending, welding, coating, lowering pipeline sections into the trench, and backfilling. In general, construction widths would be 50 to 75 feet when not adjacent to a road and 25 to 50 feet when adjacent to an existing or new road. Newly constructed pipelines would be hydrostatically tested to ensure structural integrity. As an example of water requirements, approximately 2,700 gallons of water would be required to test one mile of four-inch pipeline. Hydrostatic test water would be disposed of as approved by the BLM and/or the state.

2.1.5 Compression, Gas Treatment, and Ancillary Facilities

Because the existing compression infrastructure in the project area would not provide sufficient capacity to compress the additional gas volumes anticipated from the CD-C project, supplemental compression would be required at various locations throughout the project area. An estimated 24,936 horsepower (hp) of additional compression may be needed as the project is developed for dedicated compressor sites and at well sites. The additional compressor sites, including a large central pipeline compression facility and possibly some well-site compression, could add up to 60 acres of disturbance.

It is anticipated that one additional central gas-processing/stabilization facility would be needed within the project area, affecting up to 30 acres.

2.1.6 Produced-Water Disposal

Produced water from conventional natural gas production may be stored in tanks at the well site prior to transport by water-hauling trucks or transported in flowlines to collection facilities for disposal. All produced water disposal would be in accordance with applicable WOGCC and WDEQ requirements and approved under BLM Sundry Notice, as appropriate. An estimated 30 new injection wells and 20 produced water handling facilities would be constructed to dispose of produced water. The Operators have no plans for surface discharge of produced water. Conventional wells in the project area average 18 bbls/day of produced water. Produced water, condensate, and gas would be separated at the well site or at central facilities. Depending on the method of disposal, permits are required from WDEQ-WQD (surface) or WOGCC (subsurface) for disposal of produced water.

The Project EIS and any associated approval actions do not include the disposal of produced water from coal bed methane (CBM) development. The actual volumes produced and the methods by which the produced-water would be managed are greatly dependent on the site-specific development proposals, and it would be speculative for the BLM to analyze this aspect of CBM development in detail in this EIS. When the BLM receives site-specific CBM proposals in the CD-C project area, those proposals, including their produced water treatment, will be analyzed in a future NEPA document.

2.1.7 Reclamation

Interim reclamation on well pads and roads would begin as soon as possible after the well is put into production. The reserve pit, that portion of the well location and access road not needed for production operations, and pipeline corridors would be reclaimed according to the requirements specified in the approved APDs. Well pads and roads would be reclaimed and reseeded back to the minimum size required.

When production at a well site is completed, the Operators would cut off the casing three feet below the final graded ground level and cap it. All surface equipment would be removed from the site and the surface would be recontoured to its original appearance, to the extent possible. Topsoil would be distributed over the location to blend the site in with its natural surroundings. All surface disturbance would then be planted with an appropriate seed mixture. Reclaimed sites would be monitored to ensure erosion is prevented and/or controlled and the desired plant species are being re-established. Monitoring would continue until the reclamation is deemed successful.

The CD-C Agency Preferred Alternative includes implementation of Reclamation Guidance (Appendix E of the Draft EIS). The Reclamation Guidance is designed to achieve successful reclamation and with it the various stages of vegetative recovery, while permitting flexibility in site-specific reclamation activities.

3. Habitat/Affected Environment Overview

The CD-C project area is located within the Omernik Level III "Wyoming Basin" Ecoregion 18 (Omernik 1987), a broad intermontane basin dominated by arid grasslands and shrublands and interrupted by high hills and low mountains. Two Level IV Ecoregions are present within the project area: 18a (Rolling Sagebrush Steppe) and 18e (Salt Desert Shrub Basins).

Ecoregion 18a is a vast, semiarid region of rolling plains, alluvial and outwash fans, hills, cuestas (a ridge with a gentle slope on one side and a cliff on the other), mesas, and terraces. Average annual precipitation in this ecoregion ranges from 10–12 inches depending upon elevation and proximity to mountains. The dominant vegetation is sagebrush (*Artemisia* spp.), often associated with various wheatgrasses (*Agropyron* spp.) or fescue (*Festuca* spp.). The ecoregion is also interspersed with desert shrublands, dunes, and barren area in the more arid parts (e.g., Red Desert), and with mixed-grass prairie at the eastern limit of the ecoregion (Knight 1994). Streams originating in the center of the basin are usually incised with a low gradient with fine gravel substrates derived from shales. Small streams are ephemeral or weakly intermittent with sand or platy shale substrates (EPA 2003, 2004).

The Salt Desert Shrub (18e) ecoregion includes disjunct playas and isolated sand dunes. The plains, terraces, and rolling alluvial fans of Ecoregion 18e have soils that tend to be more alkaline and less permeable than soils in the Rolling Sagebrush Steppe (18a). Vegetation is a sparse cover of xeric-adapted species such as shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), and Gardner's saltbush (*Atriplex gardneri*). Areas with stabilized sand dunes are dominated by alkali cordgrass (*Spartina gracilis*), Indian ricegrass (*Achnatherum hymenoides*), blow-out grass (*Redfieldia flexuosa*), alkali wildrye (*Leymus simplex*), and needle-and-thread (*Hesperostipa comata*). Streams are incised and flow into playa areas that are usually seasonal and have high levels of soluble salts (e.g., Chain Lakes area).

Riparian and wetland habitats are found at only a few locations in the project area. Freshwater wetlands in the northern portion of the project area occur along Riner Road (BLM 3203) in the Chain Lakes area, and along Luman Road (SCR 20) north of Horseshoe Bend, where a flowing well supplies year-round water to an enclosed water impoundment surrounded by emergent vegetation. The George Dew/Red Wash wetland complex is located near Dad about 25 miles north of Baggs, west of and adjacent to WY 789. This site encompasses approximately 6 miles of willow-dominated (*Salix* sp.) riparian corridor along Muddy Creek with associated floodplain and meadows ranging from 0.25 to 0.75 mile wide, constructed and natural impoundments, and adjacent upland sites dominated by greasewood, sagebrush, and Gardner saltbush.

The primary cover types associated with these two ecoregions are described in **Table 3-1** and **Map 3-1.**

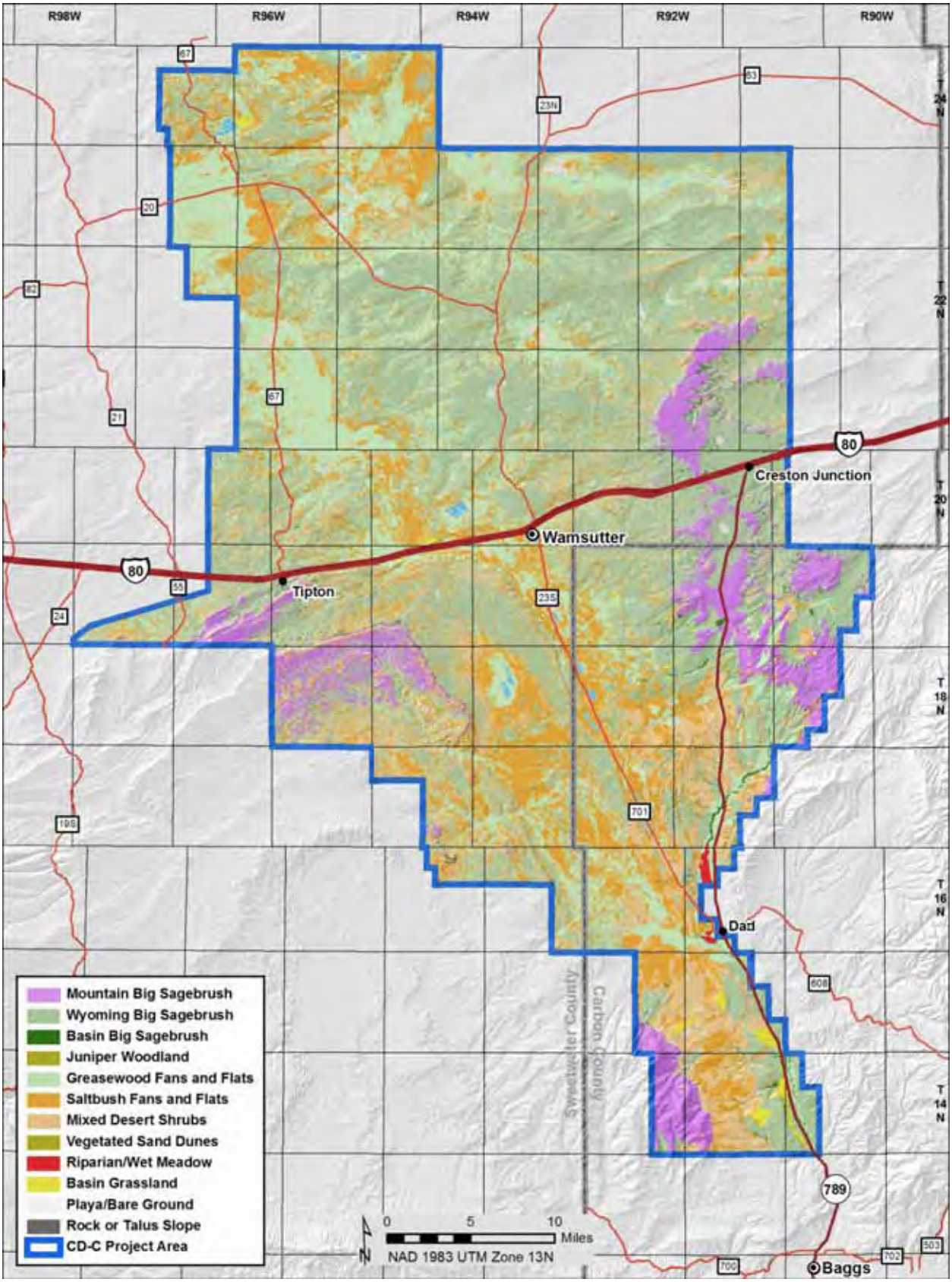
Table 3-1. Primary cover types within the CD-C project area

Primary Area	Acres	Percent of Total Project Surface Area
Wyoming Big Sagebrush	417,572.7	39.00
Greasewood flats and fans	246,272.7	23.00
Saltbush flats and fans	172,698.7	16.10
Mixed desert shrub	142,062.6	13.30
Mountain Big Sagebrush	54,605.9	5.10
Basin Big Sagebrush	7,157.1	0.70
Basin grassland	5,122.2	0.50
Bare ground	4,117.5	0.40
Water	2,128.5	0.20
Rock or talus slope	1,033.9	0.10
Riparian/wet meadow	1,003.7	0.10
Juniper woodland	536.0	0.05
Vegetated sand dunes	275.5	0.03
Playa	124.3	0.01

Almost all of the CD-C project area drains into two basins: the Little Snake River Basin (a component of the Colorado River system) and the Great Divide Basin. A very small portion of the far western part of the project area drains into Bitter Creek, also a component of the Colorado River system. Muddy Creek, which drains the southeastern portion of the project area, feeds into the Little Snake River Basin. The majority of the northern part of the project lies within the Great Divide Basin, which is closed, with no outflow to an ocean.

Except for Muddy Creek, perennial streams are not present within the project area due to limited precipitation. The majority of drainages within the project area are ephemeral. Ephemeral water tables are always below the stream channel, only flowing in direct response to precipitation or snowmelt. Ephemeral waters only support very limited aquatic communities for the short periods when surface flow is present, although some ephemeral streams in the project area may be used for spawning.

Muddy Creek is the largest stream within the project area. It is a warm-water stream that is designated as class 2AB by the Wyoming Department of Environmental Quality (WDEQ) and supports game and non-game species. Muddy Creek exhibits perennial flow for the majority of its length and in some years flows intermittently as a result of irrigation water removal south of the George Dew/Red Wash wetlands complex. In years with high runoff amounts, Muddy Creek flows perennially throughout its length. The stream typically becomes intermittent during late summer and early fall. Muddy Creek has alkaline pH (8.2–8.6) and relatively high Total Dissolved Solids (346–2,810 mg/L). Dissolved oxygen measurements were high, generally $\geq$10 mg/L. These values were of sufficient quality to support aquatic life. No streams other than Muddy Creek within the project area sustain any fish species (WGFD 1998).



Map 3-1. Major land cover types within the CD-C project area

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

About 286 reservoirs and ponds (<1–960 acres) are present within the project area. Some of these are fed by waters recovered from wells drilled at upstream locations, while others are impoundments on small drainages. These man-made impoundments are generally designed to supply water for livestock and wildlife use. Only one of these, Little Robbers Gulch Reservoir, is stocked annually with Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) by the WGFD. None of the others are known to sustain fisheries.

As described in **Section 2.1**, up to 8,950 new natural gas wells and ancillary facilities would be anticipated over the 15-years development period. The project is estimated to initially disturb a total of 43,808 surface acres, which represents about 4.1 percent of the total land surface of the project area. During the projected 30–50 year life of the project, the initial 43,808 acres of disturbance would be reduced to about 17,628 acres depending upon time required for successful reclamation. In addition to the 43,808 acres initially disturbed by implementation, an estimated 60,176 acres of historic disturbance already exist within the project area. The addition of historic disturbance to CD-C project disturbance would result in a grand total of 103,984 acres or about 9.7 percent of the total project area. Much of that earlier disturbance remains unvegetated and in use, an estimated 17,663 acres. Together with long-term disturbance from the CD-C project, up to 35,291 acres, or about 3.3 percent of the total project area would remain in an unvegetated state.

The majority of development would likely occur in the Wyoming big sagebrush, greasewood flats and fans, and saltbush flats and fans primary cover types, which collectively occupy about 78 percent (**Table 3-1**) of the project's land surface area. Wyoming big sagebrush plant communities typically occur on sites with low precipitation and poor soil development, which increases the difficulty of reclamation and makes it likely that only initial shrub re-establishment would occupy disturbed sites during the estimated 30–50 year life of the project. Greasewood communities occupy about 246,000 acres (**Table 3-1**) within the project area. They are primarily located within the Muddy Creek drainage in the southern portion of the project area and within several large greasewood-dominated flats in the Red Desert Basin area in the northern portion of the project area.

Due to the scarcity of wetland/riparian sites on the project area, the probability of well pads, roads, pipelines, and ancillary facilities impacting these resources is low. The Rawlins RMP (BLM 2008b) specifies that a 500-foot buffer be maintained around perennial waters, springs, wells, wetlands, and areas within 100 feet of the inner gorge of ephemeral channels. These restrictions not only protect perennial water sources and wetland/riparian sites, but also basin big sagebrush sites which are often located in or adjacent to ephemeral drainages and provide protection and foraging habitat for numerous wildlife species, including Greater Sage-Grouse. The probability of removing wetland vegetation or disturbing any Waters of the U.S. is low due to their low occurrence within the project area and existing federal and state laws and regulations providing for their protection.

4. Status of Species and Critical Habitat in the Project Area by Species

Of the 21 Threatened, Endangered, Proposed, or Candidate species and/or areas of designated Critical Habitat that occur in, or downstream from, Carbon and Sweetwater counties where the project is located (**Table 1-1**) only eight are potentially present within, or downstream from, the CD-C project area (USFWS 2013a, **Table 4-1**). The black-footed ferret, yellow-billed cuckoo, Wyoming toad, Preble's meadow jumping mouse, blowout penstemon, Colorado butterfly plant and its Critical Habitat, and the five listed North Platte River species and their Critical Habitat are located within the RFO; however, they are not located nor do they have habitat within or near the CD-C project area.

Table 4-1. Occurrence potential of Threatened, Endangered, Proposed, and Candidate species within or near the CD-C project area

Species	Scientific Name	Occurrence Potential within the project area[1]	Status[2]
Mammals			
Canada lynx	*Lynx canadensis*	VU	Threatened
Birds			
Greater Sage-Grouse	*Centrocercus urophasianus*	P	Candidate
Fish[3]			
Bonytail	*Gila elegans*	PAD	Endangered
Colorado pikeminnow	*Ptychocheilus lucius*	PAD	Endangered
Humpback chub	*Gila cypha*	PAD	Endangered
Razorback sucker	*Xyrauchen texanus*	PAD	Endangered
Colorado River System Critical Habitat		PAD	
Plants			
Ute ladies'-tresses	*Spiranthes diluvialis*	U	Threatened

[1] *Occurrence potential includes: present (P); potentially present (pp); unlikely (U); very unlikely (VU); and potentially affected downstream (PAD).*

[2] *Candidate species are those for which the USFWS has sufficient information to propose for listing as Threatened or Endangered under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing actions. Proposed species are those Candidate species that were found to warrant listing as either Threatened or Endangered and are currently undergoing a 12-month status review. Conservation measures for Candidate and Proposed species are voluntary but recommended because, by definition, the species may warrant future protection under the ESA if adequate conservation measures are not in place.*

[3] *Present in the Colorado River system downstream of the project area.*

Table 4-2 provides a summary of the anticipated impacts of the CD-C project on the ESA-listed and Candidate species shown in **Table 4-1**.

Table 4-2. Summary of project impacts on Threatened, Endangered, Proposed, and Candidate species within or near the CD-C project area

Feature Resource	Impact
Canada lynx	May affect but not likely to adversely affect due to the lack of suitable habitat and the requirement to avoid impacts to riparian systems.
Endangered fish	May affect and is likely to adversely affect; additionally, the project may contribute to the destruction or modification of designated Critical Habitat.
Ute ladies'-tresses	May affect but not likely to adversely affect due to the lack of suitable habitat and the requirement to avoid impacts to riparian systems.

4.1 Canada Lynx

The Canada lynx is a medium-sized cat with long legs, large, well-furred paws, long tufts on the ears, and a short, black-tipped tail. The winter pelage of the lynx is dense and has a grizzled appearance with grayish-brown mixed with buff or pale brown fur on the back, and grayish-white or buff-white fur on the belly, legs and feet. Summer pelage of the lynx is more reddish to gray-brown. Adult males average 10 kilograms (22 pounds) in weight and 85 centimeters (33.5 inches) in length (head to tail), and females average 8.5 kilograms (19 pounds) and 82 centimeters (32 inches). The lynx's long legs and large feet make it highly adapted for hunting in deep snow (USFWS 2013b).

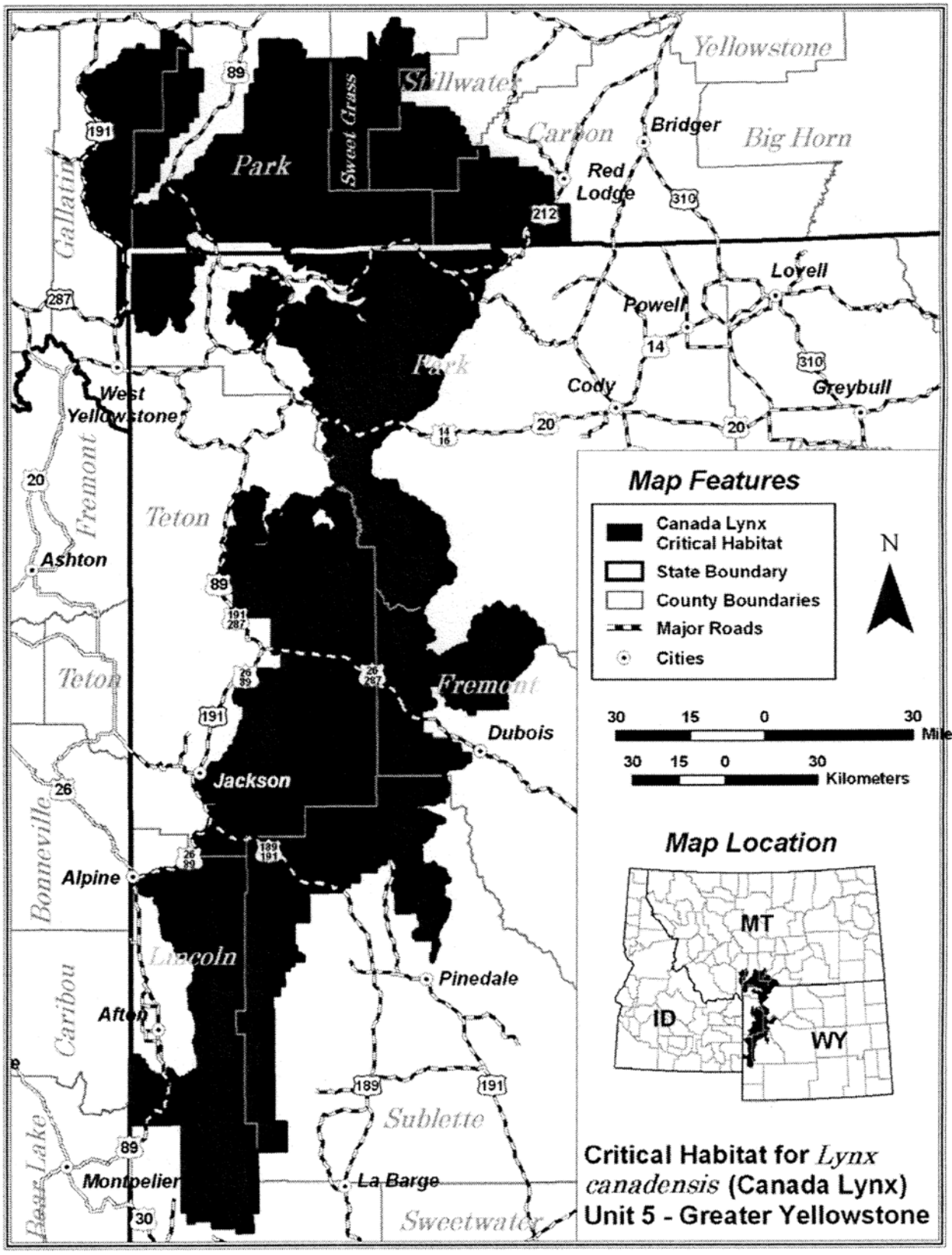
The distribution of lynx in North America is closely associated with the distribution of North American boreal forest. In Canada and Alaska, lynx inhabit the classic boreal forest ecosystem known as the taiga. The range of lynx populations extends south from the classic boreal forest zone into the subalpine forest of the western United States, and the boreal/hardwood forest ecotone in the eastern United States. Forests with boreal features extend south into the contiguous United States along the North Cascade and Rocky

Mountain Ranges in the west, the western Great Lakes Region, and northern Maine. Within these general forest types, lynx are most likely to persist in areas that receive deep snow and have high-density populations of snowshoe hares, the principal prey of lynx (USFWS 2013b).

In 1999, the Colorado Department of Wildlife (CDOW) began reintroducing the Canada lynx into the San Juan Mountains of southwest Colorado. Subsequent radio and satellite tracking has demonstrated reproduction and dispersal of individuals from the southern Colorado re-introduction area through the Colorado Rockies and into the Medicine Bow National Forest in south-central Wyoming, continuing northwest into the Greater Yellowstone Area (GYA), supporting the possibility of dispersal through the project area (CDOW 2010).

The Wyoming BLM issued a Statewide Programmatic Biological Assessment for Canada lynx (BLM 2005) which provides support for the concept of CD-C project area riparian corridors potentially serving as travel linkages for the species, "The Rawlins FO does, however, have non-delineated potential travel linkage and movement corridors that may be of value to lynx. These include: 1) a number of riparian corridors coming out of the Sierra Madre range; 2) the low-elevation, sparsely forested lodgepole and ponderosa pine and juniper stands between the Medicine Bow and Sierra Madre ranges may be useful for movement between the two mountain ranges; and 3) a potential corridor along the Shirley, Seminoe and Ferris mountains, which (along with the Green and Crooks mountains) form a linkage between the Medicine Bow Range and the Wind River Range." This biological assessment also provides direction for "an action plan delineating these three linkage corridors and determining any management restrictions needs to be developed to further the conservation of the lynx"; however, this plan has not yet been developed.

The GYA is identified as Unit 5 of designated Critical Habitat for the species in the lower 48 states and comprises Yellowstone National Park and surrounding lands in southwest Montana and northwest Wyoming including Park, Teton, Fremont, Sublette, and Lincoln Counties in Wyoming (**Map 4-1**). This area was occupied by lynx at the time of listing and is currently occupied by the species. The area contains the physical and biological features essential to the conservation of the lynx. The GYA is naturally marginal lynx habitat with highly fragmented foraging habitat (USFWS 2009). Unit 5 is the southernmost of the designated Critical Habitat areas; no Critical Habitat for the species has been designated in Colorado or south-central Wyoming.



Map 4-1. Canada Lynx Critical Habitat Unit 5 (USFWS 2009)

4.2 Colorado River Fish

Four federally Endangered fish species may occur as downstream residents of the Colorado River System: Colorado pikeminnow (*Ptychocheilus lucius*), bonytail (*Gila elegans*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) (USFWS 2004a). The Colorado pikeminnow, bonytail, and humpback chub are all members of the minnow family. The razorback sucker is a member of the sucker family. All four of these fish species share similar habitat requirements and historically occupied the same river systems. Declines in populations of these species are mainly attributed to the impacts of water development (e.g. dams and reservoirs) on natural temperature and flow regimes, creation of migration barriers, habitat fragmentation, the introduction of competitive and predatory non-native fishes, and the loss of inundated bottom lands and backwater areas (Minckley and Deacon 1991, USFWS 1993). The Final Programmatic Biological Opinion on the Management Plan for Endangered Fishes in the Yampa River Basin, also identifies pesticides and pollutants as additional threats to the four Colorado River fish species (USFWS 2005b).

The last sighting of any of these fish species in the Little Snake River was of a single Colorado pikeminnow in 1990. No Critical Habitat for these species has been designated in Wyoming (Upper Colorado River Endangered Fish Recovery Program 1999). However, the potential for project-related reductions in water quantity and/or quality to tributaries to the Colorado River warrant their inclusion in this EIS.

Habitat of the **bonytail** is primarily limited to narrow, deep, canyon-bound rivers with swift currents and whitewater areas (Valdez and Clemmer 1982; Archer *et al.* 1985; Upper Colorado River Endangered Fish Recovery Program 1999). With no known reproducing populations in the wild today, the bonytail is thought to be the rarest of the Endangered fishes in the Colorado River System. The bonytail historically inhabited portions of the upper and lower Colorado River basins. Today in the upper Colorado River Basin, only small, disjunct populations of bonytail are thought to exist in the Yampa River in Dinosaur National Monument, in the Green River at Desolation and Gray canyons, in the Colorado River at the Colorado/Utah border, and in Cataract Canyon (USFWS 2005b).

The **Colorado pikeminnow** is the largest member of the minnow family and occurs in swift, warm waters of the Colorado River basins. The species was once abundant in the mainstem of the Colorado River and most of its major tributaries throughout Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, California, and Mexico. It was known to occur historically in the Green River of Wyoming at least as far north as the City of Green River. In 1990, one adult was collected from the Little Snake River in Carbon County, Wyoming (Baxter and Stone 1995). Subsequent survey attempts to collect Colorado pikeminnow from this area of the Little Snake River by WGFD personnel failed to yield any other specimens.

Habitat of the **humpback chub** is also limited to narrow, deep, canyon-bound rivers with swift currents and whitewater areas (Valdez and Clemmer 1982, Archer *et al.* 1985, USFWS 2005b). The humpback chub was historically found throughout the Colorado River System and its tributaries, which are used for spawning (Valdez *et al.* 2000). It is estimated that the humpback chub currently occupies 68 percent of its original distribution in five independent populations that are thought to be stable (Valdez *et al.* 2000).

The **razorback sucker** is an omnivorous bottom-feeder and is one of the largest fishes in the sucker family. Adult razorback sucker habitat use varies depending on season and location. This species was once widespread throughout most of the Colorado River Basin from Wyoming to Mexico. Today in the Colorado River Basin, populations of razorback suckers are only found in the upper Green River in Utah, the lower Yampa River in Colorado, and occasionally in the Colorado River near Grand Junction (USFWS 2005b).

Suitable habitat for these four fish species exists downstream of the project area in the Little Snake, Yampa, and Green Rivers. Because the Colorado pikeminnow is found in the Little Snake River, it could migrate into Muddy Creek. Muddy Creek, however, is not suitable habitat for this species.

The Upper Colorado River Endangered Fish Recovery Program is a partnership working to recover the Endangered fish of the Upper Colorado River Basin (USFWS 2005b). The goal of recovery is to achieve natural, self-sustaining populations of the Endangered fish so that they no longer require protection under the ESA. Under the Recovery and Implementation Program (RIP) for Endangered Fish Species in the Upper Colorado River Basin, "any water depletions from tributary waters within the Colorado River drainage are considered as jeopardizing the continued existence of these fish." Tributary water is defined as water that contributes to instream flow habitat. Depletion is defined as water that would contribute to the river flow if not intercepted and removed from the system.

The FWS has determined that progress made under the RIP has been sufficient to merit a waiver of the mitigation fee for depletions of 100 acre-feet per year or less (Memorandum dated April 9, 1995 to Assistant Regional Director, Ecological Services, Region 6, from Regional Director 6, "Intra-Service Section 7 Consultation for Elimination of Fees for Water Depletions of 100 acre-feet or Less from the Upper Colorado River Basin"). Depletions of 100 acre-feet or more per year may require payment of a one-time depletion fee by the project proponent.

4.3 Ute Ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis* Sheviak) was designated by the FWS as a Threatened plant species throughout its range in 1992. The FWS, Wyoming Ecological Field Office, has determined that Ute ladies'-tresses may occur in suitable habitats within Carbon and Sweetwater counties, where the CD-C project is located (**Table 4-1**). The species is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams with an elevation range of known occurrences from 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,500 feet). Ute ladies'-tresses is not known to occur within the CD-C project area and the likelihood of occurrence is low for the following reasons: (1) much of the project area is very arid and there are few perennial streams; (2) the elevation of the project area is near the upper limit for the species; (3) very few moist riparian area meadows are present; (4) where moist soils are present, the transition from stream margins to upland vegetation is abrupt; and (5) in Wyoming, the species has only been located in the eastern and southeastern portions of the state, in Converse, Goshen, Laramie, and Niobrara Counties (Fertig 2000).

As a component of the requirements for the CD-C EIS and to fulfill FWS Section 7 requirements of the ESA, Hayden-Wing Associates, LLC (HWA) conducted field surveys during the 2006 and 2007 growing seasons to locate and map special status plants populations identified by the RFO and the FWS (HWA 2008). Ute ladies'-tresses was included in the surveys. These surveys failed to document the presence of Ute ladies'-tresses or any suitable habitat within the CD-C project area. The survey indicated that the likelihood of finding suitable habitat for Ute-ladies tresses within the project area is minimal based on the following assessment, using FWS-defined disqualifying factors (USFWS 1995), of potential habitat made during the survey:

1. **Appropriate hydrology is not present**, typically indicated by an area of mostly upland vegetation that dries up by mid-July, with a water table lower than 12 inches below the surface. The potential areas surveyed were dominated by upland plant species such as Western wheatgrass, threadleaf sedge, Plains pricklypear cactus, Gardner's saltbush and Wyoming big sagebrush. With the exception of the George Dew/Red Wash wetland complex, the areas surveyed are dry by mid-July, with a water table lower than 12 inches below the soil.
2. **The soils in the survey areas are strongly alkaline**, typically indicated by whitish (alkali) residue on ground surface where pools have evaporated, salt marks present along stream shoreline and water's edge, and the presence of salt-tolerant invasive plants. The survey indicated the presence of high salt content soils along Muddy Creek and stream bank salt marks. In addition, there was a dominance of saline-tolerant plant species along Muddy Creek.
3. **The soils in the survey areas are predominantly heavy clays.** Muddy Creek channels and streambeds are dominated by heavy clay soils. Most of the upland areas surveyed have a high

proportion of clays which are members of the smectite group (mostly montmorillonite) with clay-derived shale outcrops fairly common; during the geologic past, natural erosion has deposited these upland, shale-derived clays, into the draws and water channels of the project area.

4. **The sites are heavily disturbed**. This factor was not applicable to the survey areas.
5. **Streams tend to be deeply incised** and the transition from upland areas to the stream margin is abrupt. Stream banks of Muddy Creek are steep and demonstrate an abrupt transition zone from upland vegetation to species normally associated with riparian habitats.
6. **Site characterized by apparent non-moving water** where cattails, bulrushes, and other aquatic-type vegetation are dominant. Riparian areas surveyed such the George Dew/Red Wash wetland complex are vegetated with dense rhizomatous species such as reed canarygrass and cattails.
7. **Riparian areas or stream banks vegetated with dense rhizomatous species** such as reed canarygrass and cattails. Riparian areas surveyed such the George Dew/Red Wash wetland complex are vegetated with dense rhizomatous species such as reed canarygrass and cattails.
8. **Riparian areas have been overgrazed** to the point that only native upland species and invasive weeds are present. This factor was not applicable to the survey areas.
9. **Potential habitat is no longer in a natural condition.** This factor was not applicable to the survey areas.
10. **Wetland is a brackish playa or pothole not fed by a perennial water source** or connected by a source of fresh water. This factor was not applicable to the survey areas.

The potential Ute ladies'-tresses habitat areas surveyed met six of the ten disqualifying factors defined by the FWS and the remaining four were not applicable.

Critical Habitat for the Ute ladies'-tresses within the project area has not been designated by the FWS.

5. Direct and Indirect Impacts of the Proposed Project by Species

5.1 Canada Lynx

Direct Impacts

Due to the lack of suitable habitat and the extremely limited possibility of lynx using the project area as a travel corridor, direct impacts to the species are not anticipated. The BLM Rawlins RMP established required riparian area setbacks of 500 feet for disturbance actions (BLM 2008b). This setback would further reduce the opportunity for direct impact to any transient lynx.

Indirect Impacts

Indirect impacts to the species could result from the removal of, or impacts to, riparian areas used as travel corridors. The mitigations established by the RMP to protect riparian areas (avoidance by 500 feet) would protect potential travel corridors in the project area.

5.2 Colorado River Species

Direct Impacts

Suitable habitat for the four Colorado River fish species is not found in the CD-C project area but exists downstream of the project area in the Little Snake, Yampa, and Green Rivers. Because the Colorado pikeminnow is found in the Little Snake River, it could migrate into Muddy Creek. Muddy Creek, however, is not considered suitable habitat for this species. Designated Critical Habitat is located well downstream from the CD-C project area, where the Little Snake River meets the Yampa River, about 75 miles away. Although these fish species currently only exist downstream of the project area, water draining from

the project area affects the downstream habitat for these species. The sources of risks to these fish species are water depletions, discharges of produced water, and spills of toxic materials.

Produced water from the CD-C project would not be discharged to the surface and hence produced water would not find its way to Muddy Creek and the Little Snake River drainage. Therefore, produced-water discharges will not pose a risk to these species. For any future proposals involving CBM, the proposed treatment and disposal of produced water will be analyzed in a separate NEPA document.

Accidental releases (e.g., spills) of toxic chemicals could occur. However, accidental releases of toxic chemicals would become highly diluted before they would reach any downstream waters where these species occur; consequently, the risks from such occurrences are negligible (BLM 2007a). For example, the average annual discharge from 2004-2012 (the period of record) for Muddy Creek at USGS Station 09258980 near Baggs, immediately upstream from the Little Snake River, is 22 cfs. Average annual discharge in the Little Snake River near Slater at USGS Station 09253000, upstream of the confluence of Muddy Creek, for this same period was 259 cfs, 12 times greater than the flow in Muddy Creek. Average annual discharge in the Yampa River at USGS Station 09260050 near Deer Lodge, downstream of the confluence of the Yampa River with the Little Snake River for this same period was 2189 cfs, which is 98 times greater than the average annual discharge in Muddy Creek. Average annual discharge in the Green River at USGS Station 09261000 near Jensen, UT for this same period was 3887 cfs, which is 173 times greater than the average annual discharge in Muddy Creek near Baggs. On average, Muddy Creek water is diluted by flow in the Little Snake River about 12:1, by flow in the Yampa River about 98:1 and by flow in the Green River about 173:1. Any toxic chemicals in accidental spills to Muddy Creek would be diluted similarly, greatly reducing their potential toxicity to fish in these waters.

Indirect Impacts

The Upper Colorado River Endangered Fish Recovery Program is a partnership working to recover the Endangered fish of the Upper Colorado River Basin. The goal of recovery is to achieve natural, self-sustaining populations of the Endangered fish so that they no longer require protection under the ESA. Under the Recovery and Implementation Program (RIP) for Endangered Fish Species in the Upper Colorado River Basin, "any water depletions from tributary waters within the Colorado River drainage are considered as jeopardizing the continued existence of these fish." Tributary water is defined as water that contributes to instream flow habitat. Depletion is defined as water that would contribute to the river flow if not intercepted and removed from the system.

The FWS has determined that progress made under the RIP has been sufficient to merit a waiver of the depletion fee, which helps fund the RIP, for depletions of 100 acre-feet per year or less (Memorandum dated April 9, 1995 to Assistant Regional Director, Ecological Services, Region 6, from Regional Director 6, "Intra-Service Section 7 Consultation for Elimination of Fees for Water Depletions of 100 acre-feet or Less from the Upper Colorado River Basin"). The Preferred Alternative, however, is estimated to deplete more than 100 acre-feet per year so a one-time depletion fee may be required.

The CD-C proponents do not intend to use any surface water in their development and production activities. Water needed for drilling and completion activities would come from new and existing State Engineer's Office (SEO)-approved local water wells, as well as from produced-water sources. Most (96 percent) SEO-approved wells are completed in Tertiary age aquifers, particularly the Wasatch Formation. According to Mason and Miller (2005), the Wasatch Formation has the potential to lose groundwater to the southeast and ultimately to the Colorado River system. Roughly 20 percent of the Wasatch Formation within the CD-C project area is within that portion of the Washakie Structural Basin that loses groundwater to the southeast toward the Little Snake River, a tributary of the Colorado River. As such, an interruption of this groundwater flow could lead to depletions to the Colorado River system, although the proportion of flow in the Little Snake River that comes from groundwater discharge from the Wasatch Formation has not been quantified.

The CD-C project's estimated annual freshwater use would range from 1,856 to 3,248 ac-ft /yr and would average 2,552 ac-ft /yr. Assuming that CD-C project groundwater use from the Wasatch Formation is

evenly distributed across the project area, approximately 20 percent of the groundwater would come from that portion of the Wasatch Formation that could contribute water to the Little Snake River. Therefore, a range of 371 to 650 ac-ft, of groundwater, averaging 510 ac-ft, would be removed from the Wasatch Formation in this area each year. Fisk (1967) estimated that the Wasatch Formation within the Washakie Structural Basin holds some 300,000,000 ac-ft of groundwater in storage. In light of this volume of groundwater in storage, the average 510 ac-ft/yr withdrawn from the Wasatch Formation within the Washakie Structural Basin (estimated at removal of 0.00017% of the water in the formation each year) would likely have no measurable effect on Colorado River flows. However, these groundwater withdrawals may result in a depletion in the Colorado River flows and therefore the project proponent may be required to make a contribution to the Upper Colorado River Endangered Fish Recovery Program for water depletions.

5.3 Ute Ladies'-tresses

Direct Impacts

Potential direct impacts to Ute ladies'-tresses include destruction of plants or suitable habitat by construction or other activities related to well pads, roads, pipelines or other facilities. However, suitable habitat is not known to occur within the CD-C project area and the likelihood of occurrence on public, state, or private lands within the project area is low because much of the project area is very arid and there are few perennial streams, the elevation of the project area is near the upper limit for the species, very few moist riparian area meadows are present, and, where moist soils are present, the appropriate site specific conditions are not found. CD-C project surveys in 2006 and 2007 established that the few areas of potential habitat met a number of the factors established by the FWS that disqualified them as suitable habitat. Because the potential for occurrence of the plants or their habitat on public, state, or private lands in the project area is low, the likelihood of direct impacts to Ute ladies'-tresses is also low.

The low likelihood of impact is further reduced by protective measures that would insure that activities that might directly impact plants or habitat would not occur within that habitat. The Rawlins RMP bars surface disturbing activity within 500 feet of perennial waters, springs, and wetland and riparian areas, the types of areas where Ute ladies'-tresses habitat might be located. In addition, USACE guidelines require identification and protection of wetlands, special aquatic sites, and other waters of the U.S. (USACE 2013). Wetlands include marshes, wet meadows, and streams that are ephemeral, intermittent, or perennial. Other non-wetland surface waters such as playas, ponds, reservoirs, irrigation ditches and canals are also included. Protection of these landscape features would also serve to protect Ute ladies'-tresses habitat, in the unlikely event that such habitat was present in the CD-C project area.

Indirect Impacts

Ute ladies'-tresses could be indirectly affected by activities that occurred at some distance from any plants and habitat but that might still produce an adverse effect. Such activities within the CD-C project area could include accidental releases of pollutants associated with construction, drilling, and production operations and potential changes to the downstream hydrology and hydrograph of streams, seeps and springs with suitable habitat. The impacts of discharges of produced water from CBM operations is not considered here because such activities have been specifically excluded from this EIS and, if proposed, would be treated in a separate NEPA analysis.

The lack of suitable habitat within the project area makes the likelihood of indirect impacts occurring low. In addition, authorization of the proposed project would require full compliance with the Federal Clean Water Act (CWA), EO 11990 (wetlands protection), and EO 11988 (floodplain protection), and their permitting regulations at the federal and state level. These regulations address development of surface runoff, erosion, and sediment control plans; injection-well permitting; oil-spill containment and contingency plans; Stormwater Pollution Prevention Plans; Spill Prevention Control and Countermeasures Plans; and CWA Section 404 permits. Adherence to these plans, permits, leases, and

regulations for the protection of water resources would further decrease the likelihood that suitable habitat, if it occurred within the CD-C project area, would be indirectly impacted.

6. Cumulative Effects of Proposed Project

Cumulative effects are "the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered" in this biological assessment. Future federal actions that are unrelated to the CD-C project are not considered in this section because they require separate consultation pursuant to Section 7 of the Act (USFWS 1998). The cumulative effects analysis area for Canada lynx and Ute ladies'-tresses is the CD-C project area. For the four Colorado River fish, the cumulative effects analysis area includes the Muddy Creek drainage and the Little Snake River watershed.

As discussed in **Section 2** of this biological assessment, the central portion of the project area lies within the checkerboard, a pattern of land ownership resulting from early land grants from the federal government to the Union Pacific Railroad Company. The BLM, the State of Wyoming, and private parties own the surface and mineral resources covering these lands. The RFO manages BLM surface lands and the federal mineral estate in the project area. The BLM manages approximately 626,932 surface acres (58.6 percent), the State of Wyoming owns approximately 48,684 acres (4.5 percent), and private landowners own approximately 394,470 acres (36.9 percent), as shown in **Map 2-1**.

"Actions that are reasonably certain to occur" include only future non-federal actions and not past and present activities and generally only actions for which a strong, current indicator of intent is available, such as an existing or imminent state permit. Past activities that are ongoing and will continue into the future, such as livestock grazing, are included. The only actions in the CD-C action area that are reasonably certain to occur on private or state lands and that do not have a federal nexus are livestock grazing on those lands and those few oil and gas drilling actions that would not require a federal permit of some kind. Most future actions that are reasonably certain to occur within the cumulative effects analysis area would require some form of federal permit, such as a right-of-way across BLM land in the checkerboard, and would thus require separate Section 7 consultation.

6.1 Canada Lynx

The cumulative effects analysis area for Canada lynx encompasses the CD-C project area. Cumulative impacts relative to the Canada lynx would result from individual well projects occurring in the CD-C on state or fee minerals and lands with no federal nexus. In the analysis area there are limited riparian corridors that the species could use for travel between the occupied habitats in northern Colorado, the Sierra Madre and the GYA. These areas could be impacted by non-federal actions that are not designed and implemented to avoid riparian systems.

6.2 Colorado River Species

The cumulative effects analysis area for the Endangered Colorado River fish species includes the Muddy Creek drainage and the Little Snake River watershed. The types of non-federal activities in the area that might affect the four fish include livestock grazing on private and state lands and those few oil and gas drilling actions that would not require a federal permit of some kind. No specific activities have been identified. The activities are not expected to generate more than minimal impacts on Muddy Creek and the Little Snake River. The amount of water depletions other than for the CD-C project, is indeterminate but is expected to be small.

6.3 Ute Ladies'-tresses

The cumulative effects analysis area for Ute ladies'-tresses encompasses the CD-C project area. The types of non-federal activities in the area that might affect the plant include livestock grazing on private and

state lands and those few oil and gas drilling actions that would not require a federal permit of some kind. As described in the biological opinion for the ROD of the Rawlins RMP, Appendix 14 (BLM 2008b), impacts to Ute ladies'-tresses from livestock grazing on private lands could be beneficial (maintaining habitat through grazing or haying) or detrimental (limiting individual plant reproductive fitness by removal of fruiting parts through trampling or ingestion). However, as previously described, direct and indirect impacts to Ute ladies'-tresses as a result of the CD-C project are not anticipated to occur because the potential for occurrence within the project area is so low.

7. Conservation Measures by Species

The Rawlins RMP ROD (BLM 2008b) on page 2-54 provides the following overarching commitments for the protection of federally listed Endangered, Threatened, Proposed, and Candidate Species:

1. *Informal conferencing and consultation with the USFWS will occur for authorized activities that would potentially affect the habitat for Endangered, Threatened, Proposed, and Candidate species within the RMPPA (Appendix 10).*
2. *Habitat and species conservation measures for Threatened, Endangered, Candidate, and Proposed species are identified in the biological assessment (USDI, BLM 2008) and the biological opinion (USDI, BLM 2008). Both documents will be adhered to for compliance with the ESA and the BLM Wyoming State Director's Sensitive Species List (BLM Manual 6840). Conservation measures will be applied to all surface disturbing and disruptive activities, as appropriate. Appendix 14 lists all reasonable and prudent measures and terms and conditions for Threatened and Endangered species and conservation measures for Proposed and Candidate species.*

In addition, the RFO provides a substantial number of measures that protect wildlife habitats in general and also minimize the surface and activity disturbance that could produce direct and indirect effects on listed or proposed species. Appendix C of the draft EIS (attached) describes the standard Conditions of Approval (COAs) that the RFO places on Applications for Permit to Drill (APDs) to achieve those conservation goals and also references BMPs that the RFO can require as appropriate. Those BMPs and the entire Rawlins RMP Record of Decision can be found at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/rawlins/rod_armp.html.

7.1 Canada Lynx

While no habitat for the Canada lynx occurs in the project area it is possible the species moves through the area following riparian corridors as it disperses from occupied habitats to the south and northwest.

Given the protections applied to the riparian areas in the project area (p. 2-50 of the RMP ROD), the project is not likely to affect the Canada lynx:

21. *For the protection of amphibian species and their habitats, surface disturbing and disruptive activities will be avoided in the following areas: (1) identified 100-year floodplains, (2) areas within 500 feet of perennial waters, springs, wells, and wetlands, and (3) areas within 100 feet of the inner gorge of ephemeral channels.*

Best Management Practices from the Rawlins RMP Biological Assessment include the following, which will be considered by RFO staff biologists and applied to the CD-C Project as appropriate:

- Where applicable on BLM-administered lands, key linkage riparian travel corridors should be enhanced or maintained, using the U.S. Forest Service guidelines when possible.
- Evaluations should be made on BLM-administered public lands adjacent to identified lynx habitat to determine whether fire suppression, forest type conversions, and other forest management practices have altered, or have the potential to alter, fire regimes and the functioning of forest ecosystems. Fire management practices should be adjusted where needed to produce forest

composition, structure, and patterns more similar to those that would have occurred under historical succession and disturbance regimes, and would not negatively impact the Canada lynx. Chemical treatments would be considered when beneficial to habitat composition and structure.

- Provide for habitat conditions through time that support dense horizontal understory cover, and high densities of snowshoe hares. This includes, for example, mature multi-storied conifer vegetation, and vegetation management, including timber harvest and use of prescribed fire to increase dense horizontal cover. Design regeneration prescriptions to mimic historical fire (or other natural disturbance) events, including retention of fire-killed trees and coarse woody debris.
- Consider improvement harvests (commercial thinning, selection, etc.) to provide additional denning and foraging habitat. Improvement harvests should be designed to retain and recruit the understory of small diameter conifers and shrubs preferred by hares, as well as coarse woody debris, and maintain or improve the juxtaposition of denning and foraging habitat.
- Burn prescriptions should be designed to retain or encourage shrub and tree species composition and structure that will provide habitat for snowshoe hares, red squirrels, or other alternate prey species. In situations where objectives can still be met, design treatments and fire suppression actions to maximize lynx denning habitat.
- Map and monitor the location and intensity of snow compacting activities (for example, snowmobiling, snowshoeing, cross-country skiing, dog sledding, etc.) that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available. As this information becomes available, the types of activities which cause snow-compaction resulting in compromised lynx habitat should be limited or discouraged. Provide, where possible, a landscape with interconnected blocks of foraging habitat.
- Work cooperatively and proactively with the WGFD and other agencies to reduce incidental take of lynx related to trapping and to ensure that important lynx prey are conserved, and provide for unified management direction via habitat conservation plans, conservation easements or agreements, and land acquisitions.
- To reduce mistaken shooting of lynx, initiate and/or augment interagency information and education efforts throughout the range of lynx in the contiguous states. Utilize trailhead posters, magazine articles, news releases, state hunting and trapping regulation booklets, etc. to inform the public of the possible presence of lynx, field identification, and their status.
- Identify, map, and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx, and where needed, develop protection measures such as wildlife fencing and associated underpasses or overpasses to reduce mortalities related to those potential lynx crossings.
- Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g., straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared right-of-way, or would foreseeably contribute to development or increases in human activity in lynx habitat. Whenever rural dirt and gravel roads traversing lynx habitat are proposed for such upgrades, a thorough analysis should be conducted on the potential direct and indirect effects to lynx and lynx habitat.
- Determine where high total road densities (>2 miles per square mile) coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.
- Minimize building of roads directly on ridge tops or areas identified as important for lynx habitat connectivity, and close newly constructed roads (e.g., for access to mines, leases, or timber harvest) in lynx habitat to limit public use during project activities. This requires the design of new roads, especially near forest entrances, to allow for effective closure upon completion of sale activities, and/or upon project completion, reclaim and obliterate roads.

- Using best available science, develop a plan to identify and protect key linkage areas on federal lands from activities that would create barriers to movement. Barriers could result from an accumulation of incremental projects, as opposed to any one project. Where feasible, within identified key linkage areas, maintain or enhance native plant communities and patterns, and habitat for potential lynx prey species.
- Identify and protect potential security habitats in and around proposed developments or expansions.

7.2 Colorado River Species

Although the CD-C Natural Gas Development Project is not likely to affect the Colorado River species and their downstream habitats, the ROD for the Rawlins RMP (p. 2-54) provides the following Management Actions that will be applied to activities on public lands that would provide assurance that no impacts would occur.

20. *Surface disturbing and disruptive activities will be intensively managed (BMPs) (Appendices 14 and 15) to maintain or enhance reptile and amphibian species and their habitats.*
21. *For the protection of amphibian species and their habitats, surface disturbing and disruptive activities will be avoided in the following areas: (1) identified 100-year floodplains, (2) areas within 500 feet of perennial waters, springs, wells, and wetlands, and (3) areas within 100 feet of the inner gorge of ephemeral channels.*
22. *Fish habitats will be managed to achieve desired future condition (DFC).*
23. *Impoundments and instream structures will be designed to minimize impacts on Special Status fish species and their habitats.*
24. *Road crossings of waterbodies that potentially support fish for a portion of the year will be designed to simulate natural stream processes.*

In addition, the Preferred Alternative of the CD-C EIS places special emphasis on the Muddy Creek and Bitter Creek watersheds to reduce salt and sediment contributions to these watersheds that are tributary to the Colorado River

a. Well pads, access roads, pipelines, and ancillary facilities located within the Muddy Creek and/or Bitter Creek watersheds would be subject to intensive management.

b. A geomorphologic monitoring plan for Muddy Creek (**Appendix O of the FEIS**) has been developed and would be implemented by the BLM.

These measure would provide still further assurance that no impacts would occur on the fish or their habitat.

7.3 Ute ladies'-tresses

Although the occurrence of Ute ladies'-tresses or suitable habitat has not been identified within the CD-C project area, should undetected plants or habitat exist within the area, impacts would be avoided or minimized by the implementation of the 16 Ute ladies'-tresses conservation measures described in the Biological Opinion for the Rawlins RMP (USFWS 2007). The seven measures most likely of use during the CD-C project are:

3. *The Bureau will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects upstream and downstream may alter natural hydrology or water quality, change the vegetation of the riparian ecosystem and cause direct ground disturbance. These projects may adversely affect the orchid. These projects will be*

evaluated and redesigned to ensure that adverse effects to known populations of the orchid do not occur.

5. *Biological control of noxious plant species will be prohibited within 1.0 mile from known Ute ladies' -tresses orchid habitat until the impact of the control agent has been fully evaluated and determined not to adversely affect the plant population. The Bureau will monitor biological control vectors.*

6. *Except in cases of extreme ecological health (insect or weed outbreaks/infestations), herbicide treatment of noxious plants/weeds will be well-regulated within 0.25 miles of known populations of the orchid and insecticide treatments will be well-regulated within 1.0 mile of known populations of Ute ladies' -tresses to protect pollinators.*

   Where insect or weed outbreaks have the potential to degrade area ecological health inside the buffers listed above the following will apply: a pesticide use proposal or other site specific plan will address concerns of proper timing, methods of use, and chemicals. Pesticides specifics to dicots will be preferred where these are adequate to control the noxious weeds present.

   Aerial application of herbicides will be carefully planned to prevent drift in areas near known populations of the orchid (outside of the 0.25 mile buffer). The Bureau will work with the Animal and Plant Health Inspection Service (APHIS), the Service, and County Weed and Pest Agencies to select pesticides and methods of application that will most effectively manage the infestation and least affect the orchid.

7. *If revegetation projects are conducted within 0.25 miles of known habitat for Ute ladies'-tresses orchids, only native species will be selected. This conservation measure will reduce the possibility that non-native species will be introduced and will compete with Ute ladies' -tresses orchids.*

9. *The Bureau will apply a condition of approval (COA) on all applications for permit to drill (APDs) oil and gas wells for sites within 0.25 miles of any known populations of the orchid. This condition will prohibit all authorized surface disturbance and OHV travel from sites containing populations of the orchid. Operations outside of the 0.25 mile buffer of orchid populations, such as "directional drilling" to reach oil or gas resources underneath the orchid's habitat, would be acceptable.*

13. *All proposed rights-of-way projects (powerlines, pipelines, roads, etc.) will be designed and locations selected at least 0.25 miles from any known orchid habitat to minimize disturbances. If avoidance of adverse effects is not possible, the Bureau will re-initiate consultation with the Service.*

14. *All proposed projects will be designed and locations selected to minimize disturbances to known Ute ladies' -tresses populations, and if the avoidance of adverse affects to known populations is not possible, the Bureau will re-initiate consultation with the Service. Projects will not be authorized closer than 0.25 miles from any known populations of the orchid without concurrence/re-initiation of consultation of the Service and the Bureau authorized officer. No ground disturbing construction activities will be authorized within 0.25 miles of any known populations of the orchid during the essential growing season time period (from July through September, the growing, flowering and fruiting stages) to reduce impacts to the species.*

Beyond these measures specific to Ute ladies'-tresses, additional measures that would work against any detrimental impact on the species include:

- A RFO COA—based on the 2008 RMP—applied by BLM on all public lands that bars surface disturbing activity within 500 feet of perennial waters, springs, and wetland and riparian areas—those types of areas where Ute ladies'-tresses habitat might be located.

- USACE guidelines requiring identification and protection of wetlands, special aquatic sites, and other waters of the U.S. on all public, private, and state lands (USACE 2013).
- All regulations and permits associated with the Clean Water Act including: development of surface runoff, erosion, and sediment control plans; injection-well permitting; oil-spill containment and contingency plans; Stormwater Pollution Prevention Plans; Spill Prevention Control and Countermeasures Plans; and CWA Section 404 permits.

The Preferred Alternative of the CD-C EIS places special emphasis on the Muddy Creek Corridor and watershed, including several measures that would work to protect Ute ladies'-tresses and its habitat:

- Well pads, access roads, pipelines, and ancillary facilities located within the Muddy Creek and/or Bitter Creek watersheds would be subject to intensive management (which could include, but is not limited to, site-specific BMPs [determined during the onsite inspection by BLM hydrologist and/or soil scientist, or other applicable specialist] applied during construction and operations, the use of mat drilling, reclamation of access roads to two-tracks once production begins, implementation of and strict adherence to WY-2012-007, consolidation of facilities, closed or semi-closed loop drilling, classification of disturbance in these areas as High Surface Inspection Priorities that would ensure more frequent BLM environmental inspections, consolidation and utilization of existing roads and pipelines, no new road crossings of Muddy Creek, etc.). Additional site-specific measures may be developed during the onsite inspection.
- A geomorphologic monitoring plan for Muddy Creek (**Appendix O** of the FEIS) has been developed and would be implemented by the BLM.

8. Effects Determination for Listed Species

8.1 Canada Lynx

Given the unlikely presence of the species in the CD-C and the mitigations provided for protection of riparian areas, we therefore conclude that the CD-C Natural Gas Development Project *may affect, but is not likely to adversely affect* the Canada lynx.

8.2 Colorado River Species

The BLM has determined that all CD-C groundwater withdrawals from that portion of the Washakie Structural Basin that loses groundwater toward the Little Snake River are to be considered depletions for purposes of the RIP. Furthermore, the BLM proposes that the depletion payment be based on the maximum estimated annual usage - 650 acre-feet per year – to assure that there will be no need to consult again in the event that groundwater withdrawals were to exceed the average of 510 acre-feet per year. Assuming a depletion fee of approximately $20 per acre-foot, a total one-time depletion fee of $13,000 is estimated.

Because the groundwater withdrawals have been determined to constitute a depletion in excess of the minimum figure of 0.1 acre-feet per year considered by the FWS to be the threshold for causing significant effects, it is concluded that the CD-C Natural Gas Development Project *may affect and is likely to adversely affect* the Endangered fish of the Colorado River. Additionally, it is concluded that the project *may contribute to the destruction or modification of designated Critical Habitat* for the Colorado River Endangered fish.

8.3 Ute Ladies'-tresses

In the biological opinion on the Rawlins RMP (USFWS 2007), the FWS concurred with BLM's determination that activities described in the RMP, with the exception of certain livestock grazing

activities, would not likely adversely affect the Ute ladies'-tresses orchid. The concurrence for Ute ladies'-tresses was based on (1) lack of known occupied habitat and (2) the commitment by the BLM to implement conservation measures adequate to ensure that if adverse activities did occur in the habitat of the listed plant, the effects from Bureau activities would be sufficiently minimized by protective buffers, timing restrictions, etc. For the same reasons, this biological assessment has determined, and seeks FWS concurrence, that the Agency Preferred Alternative of the CD-C Natural Gas Development Project *may affect, but is not likely to adversely affect* the Ute ladies'-tresses or its habitat. Potential habitat is limited within the project area and the unsuitability of that habitat and the absence of the species within the habitat were documented. In the unlikely event that the species is discovered within the project area through future BLM-required site-specific surveys and/or USACE Aquatic Resources Inventories (ARIs), potential impacts to the species would be satisfactorily avoided by the conservation measures described in above in **Section 7.3**. If, for some reason, the BLM was unable to avoid such impacts when permitting some activity, the activity would be addressed through consultation with the FWS, with avoidance being the primary objective.

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